pair laterally during the prophase of meiosis, and he discounts the speculations which have been based on mitochondrial and such-like cytoplasmic structures. As regards the interpretation of the nuclear transformations which occur during meiosis, Prof. Strasburger admits that he is influenced by theoretical considerations in arriving at his final conclusions. The views he advocates are not shared by all investigators, although at the present time they are rather widely supported. But the available evidence is hardly sufficient as yet to allow of the matter being brought to a decisive issue, and, indeed, the very same preparations have been differently interpreted by the exponents of the divergent views. It is a pity, perhaps, that this should be so, but it is clearly not an unhealthy condition of affairs when the final conclusion on a question of fact is confessedly influenced by other than objective evidence.

The reader will find many other topics treated in this volume by a master hand. Evidence is given to show that the hybrid *Fragaria virginiana* × *F. elatior,* which in the F_1 generation so exactly resembles the latter (male) parent that its hybrid nature has been doubted, does really arise in this way, but that the Elatior parent is completely dominant. Alternation of generations is touched upon, and the book ends with a suggestive speculation as to how the details of nuclear structure, and in particular the meiotic divisions, have come to exhibit so close a resemblance in the higher plants and animals respectively. It is pointed out that so remarkable a fact cannot be otherwise than pregnant with real significance, especially when we reflect that we seek in vain amongst the more primitive animals and plants for the uniformity which on *a priori* grounds we might, perhaps, have anticipated would be found.

It is impossible, in bringing this notice to a close, to refrain from expressing appreciation for the manner in which Prof. Strasburger has handled the more controversial matter in his book. The invariable courtesy with which he treats the opinions of those who happen to differ from himself might well be copied by some who still appear to imagine that scientific discussion should be conducted on the lines of modern politics. Not the least of the qualities which have endeared Prof. Strasburger to a wide circle of friends, in addition to that scrupulous fairness and consideration which he always shows to others, is the open-mindedness with which he is always ready to accept the result of new discoveries, even when, as he himself says, they may involve the sacrifice of long-cherished views.

J. B. FARMER.

METALLIC ALLOYS.

Leçons sur les Alliages métalliques. By Prof. J. Cavalier. Pp. xix+466. Illustrated. (Paris: Vuibert et Nony, 1909.)

DURING the last twenty years a systematic study has been undertaken of the properties of alloys, their chemical nature and constitution, and the relations between that constitution and their useful properties. The work has been made possible by the invention of trustworthy pyrometers, by the application of microscopic examination to opaque substances, and by advances in the knowledge of chemical equilibrium. The investigations have in many cases been carried out with an industrial aim, but by throwing light on the chemistry of solid bodies they have contributed largely to the development of pure science. It is true that the whole subject is still to some extent in a state of flux, and much remains to be done in order to explain apparent contradictions, and to remove the uncertainty and provisional nature of some of the conclusions. Nevertheless, it is time to make the fundamental principles of the science of alloys part of the course of training of students of general chemistry. Prof. Cavalier's book shows a pronounced superiority for this purpose over previous attempts, and is one of the manuals which teachers of chemistry may usefully place in the hands of their students. It is based on a series of lectures delivered by the author at the University of Rennes, and is characterised by clearness of thought and of language, logical arrangement, and perfection of balance.

The first part of the book contains a brief general description of the methods of preparation and study of alloys. Ordinary chemical analysis is not dealt with, but proximate analysis, and the still more important methods of microscopic metallography and thermal study are discussed, and the physical and mechanical properties are also considered. The treatment is elementary, and is hardly full enough to help those engaged in research, but it is sufficient for students to obtain some knowledge of the methods of determining the constitution of alloys. No attempt is made to set up a complete classification of alloys based on their constitution, but perhaps this need not be regretted when the artificial aspect of some of the previous attempts at classification is remembered.

The second part of the book contains the special study of certain alloys, and is intended to show by concrete examples how the general methods have been applied in practice, and what results have been obtained. There is no attempt to make this part complete by describing all alloys, the author referring the reader to Guillet's book, "Les Alliages métalliques," published in 1906, for details of those alloys which he has omitted to mention. However, Prof. Cavalier has chosen his examples from alloys presenting some industrial interest, and has passed in review most of the important groups. He has contented himself with a single example of each case met with in a systematic study, arranging his material as far as possible in the order of increasing complexity. Thus the simple case of alloys of gold and silver is taken first. The more complicated diagrams of equilibrium assigned to lead, tin and antimony are next dealt with, and these are followed by the brasses and bronzes, in which so many solid solutions occur. The relation between constitution and useful properties find a striking example in the antifriction alloys, and the iron-carbon alloys, of which the practical importance is fundamental, present difficulties in their study owing to the existence of a labile system, and are taken last.

In the section devoted to special steels the method of describing only a few typical alloys is discarded, and a catalogue of the steels is given with their com-

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position and properties, as if a comprehensive book of reference were being written.

The faults of the book are the faults of a university professor when dealing with a practical subject. As soon as works-practice is touched on, the information is not to be trusted. Thus, in the chapter on the preparation of alloys, a somewhat misleading diagram is given of a melting furnace for crucibles, and the statement is made that the maximum charge for a crucible in such a furnace scarcely exceeds 100 kilograms. To show the inexactness of this, it is enough to mention that at the Royal Mint crucibles containing more than 180 kilogrammes of standard silver have been in use for many years, and even larger crucibles are used in mints abroad.

The merits of the volume have already been sufficiently indicated. It is a pleasure to read the book. It can hardly fail to fascinate many of the students into whose hands it will come as a task, and it will be useful to those engaged in the industries as an aid in understanding the numerous articles and papers on alloys which appear in scientific periodicals every day.

T. K. R.

OPEN-AIR STUDIES AT HOME AND ABROAD.

(1) *The Young Naturalist.* A Guide to British Animal Life. By W. P. Westell. Pp. xv+476. (London: Methuen and Co., 1909.) Price 6*s*.

(2) *Nature.* By J. H. Crawford. Pp. x+242. (London: Swan Sonnenschein and Co., 1909.) Price 5*s*.

(3) *Victorian Hill and Dale.* A Series of Geological Rambles. By Dr. T. S. Hall. Pp. x+160. (Melbourne: Thomas C. Lothian, 1909.) Price 3*s*.

(1) THE distinguishing feature of this survey of the British fauna is its comprehensiveness. With the exception of marine fish, there is no large order that does not come in for comment. The mammals, birds, fresh-water fish, and Lepidoptera—the most popular groups—are allotted most space, and are evidently more familiar to the author than the remainder. In spite of certain drawbacks, of which we shall have something to say, this book is a most suitable handbook for a boy or girl who is interested in animal life. The contents are arranged in ordinal fashion, and no attempt is made to deal with the associations of animals characterising field, moor, or lake, nor are there practical suggestions for the capture, maintenance, or preservation of specimens. There are, however, accounts of the habits and distinctive features of the commoner British animals that should be read with interest by young naturalists, and the wealth of clear photographs makes the book a most attractive one.

In dealing with the more familiar orders, the author's observations are evidently based on personal observation, but one can scarcely hope to extend this enviable acquaintance to all the groups, and accordingly there are occasions when the experience of others has to be drawn upon. Unfortunately, in these instances the authorities relied upon by Mr. Westell are not unimpeachable, and have been the cause of several misstatements. Thus, on p. 456, in speaking of the severing of a limb or part of the body, the author concludes, "This is known as autonomy." We can hardly believe the author responsible for mistaking the second "t" for an "n." But in other cases the authority is clear. On pp. 291–5 there is a description of the structure and life of fish that bristles with misleading or inaccurate statements:—"the fish's gills are its lungs"; "a fish need only open its mouth and the water pours in"; "the heart has two cavities"; "the fins along the back and the stomach are especially useful in keeping the body upright"; "probably the sense of taste and touch are only very dull"; "fishes (with one or two exceptions of tropical fishes) are hatched from eggs which are laid by the parent in very large number." Why the author should have trusted to such information instead of going to first-hand authorities we do not understand. The account of the mollusca contains several mistakes. Pearls are said to be due to "a grain of sand or other hard substance. Cephalopods "have no outside shell, the principal eight-armed Cephalopod is the Argonaut or Nautilus." This confusion is rendered still more distressing by a later note (p. 439), in which the "Paper Nautilus or Argonaut" is called "Nautilus pompilius," whilst the shell of the "common Nautilus" is figured and described as a distinct structure. There is a similar confusion between the acorn barnacle and Lepas, the goose-barnacle. The nomenclature, in fact, is inconsistent. On p. 49 the Linnean system is justified, and yet throughout the book confusion is continually arising through the want of its use. What are flat burying beetles or museum beetles? What is the Noonday Fly? Even Mr. Westell seems to become confused by this absurd nomenclature, for he tells his readers to look for the "brine shrimp" in the sea; and evidently believes in some abstraction called the *real* shrimp (p. 316). But for thorough confusion of thought, take the statements that the Brittle Star "ably practises (*sic*) this remarkable habit (of fragmentation) for it casts away in regular and methodic manner certain parts of its body during its early life," or this one of the house fly, "accused often unjustly of disseminating disease, it seems that according to Sir James Crichton Browne, there is much truth in a good deal of what has been stated."

The style of the author really needs a little chastening. "Vasty deep"; "Denizens of the deep"; "I having made observations upon the insects but not them upon me" (p. 423); "despite the hue and cry which one hears so frequently as to the dense human population that this country harbours," p. 169 (as though humans were a kind of vermin), are a few expressions that should have been cut out. We know how easy is the task of picking out weak places in the work of others, and direct attention to these flaws in a very useful book in the hope that a new edition (which certainly ought to be called for) may be even better than this one. References might then be given, in the text, to the attractive illustrations. This is a very necessary, even an essential matter, for the adder, *e.g.*, is figured on p. 20, and the de-

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